ABSTRACT

This document constitutes the final report of efforts undertaken in regard to grant N00014-89J-3172. In this program, students from the MAST Academy and other public and private high schools in Dade County were placed in laboratory positions at three oceanographic institutions on Virginia Key, Miami, Florida during the summer of 1994. These students received direct supervision from faculty members of the Rosenstiel School of Marine and Atmospheric Science (RSMAS) and from staff scientists at the Atlantic Oceanographic and Meteorological Laboratories of the National Oceanic and Atmospheric Administration (AOML/NOAA) and at the Southeast Fisheries Center, National Marine Fisheries Service (SEFC/NMFS). This program enabled high school students the opportunity to work in a marine science research environment and to more accurately appraise career opportunities in oceanographic sciences.

This document constitutes the Final Report of efforts undertaken under:

Grant No. N00014-89-J-3172/P00003
R&T Project: 4231042--04

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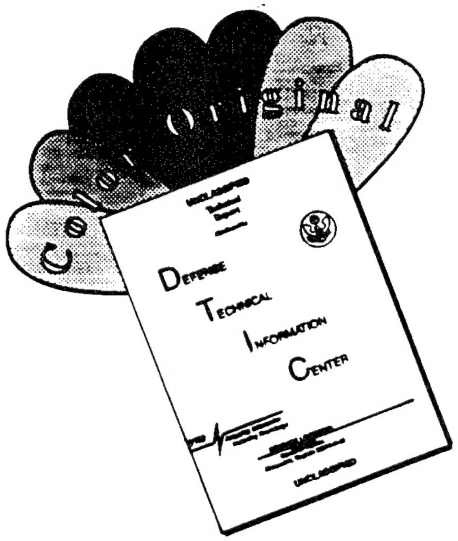

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GRANT PURPOSE

The purpose of this grant was to provide funding to conduct a high-school intern program jointly with the Dade County Public Schools. This program was supported by both the National Oceanic and Atmospheric Administration and the Navy. The conduct of the program, the personnel and effort, and the use of funds for direct and indirect expenses were generally as set forth in the Grantees' proposal entitled, "Partial Support of MAST Academy Outreach Program", dated May 18, 1994. Eligibility for this program was limited to Dade County high school students who meet the following criteria:

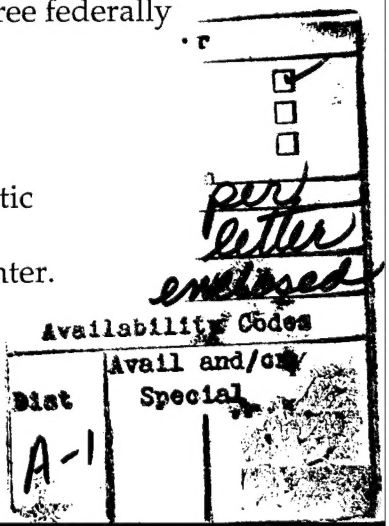
- o Entering grades 11 or 12.
- o Possess a minimum overall grade point average of 2.5 (acceptable), and 3.0 for scientific and laboratory research jobs.
- o Possess a good attendance record.
- o Successful completion of one or more of these courses: Biology, Marine Biology, Ecology, Chemistry, Physics, Computer Applications.
- o Recommended as a high achiever and hard worker who possesses a positive attitude. The student must be self-directed and able to work independently, if necessary. The student must be punctual and dependable.
- o Provide their own daily transportation.
- o Completed the application and interview process.

EXECUTION OF THE PROGRAM

Faculty at the Rosenstiel School and scientists at the NOAA/AOML and SEFC/NMFS laboratories, especially those who had participated in previous summer intern programs, were sent a request for summer positions and asked to fill out a job description form. The completed forms were then sent to the MAST Academy, where the student applicants' skills were matched with specific job descriptions (i.e., those with computer and math skills were matched with a job in scientific data processing). Copies of the job descriptions are given in Appendix A. Faculty and scientists at the three labs were then contacted and interviews with the student applicants arranged. The final list of students and supervising faculty is given in Appendix B. The program encompassed the period from July 2 through August 20, 1993.

These summer internships were paid positions and were available at three federally supported oceanographic centers. They are:

- o University of Miami, Rosenstiel School of Marine and Atmospheric Science
- o National Oceanic and Atmospheric Administration, Atlantic Oceanographic and Meteorological Laboratories.
- o National Marine Fisheries Service, Southeast Fisheries Center.



The terms of employment and opportunities in this program were as follows:

- o A maximum of fifteen summer internships were available through an application and interview process
- o Employment period was from July 1 through August 19, 1994.
- o One annual elective high school credit was earned.
- o Each student earned $4.75 per hour for a 7.5 hour day and worked a total of 35 working days.

In addition the program included the opportunity for up to five students to continue their internships during the fall semester. During administration of the 1993 program three students chose this option and continued in their lab positions during after-school hours, on weekends and during holidays. The benefits to dedicated students of continued participation in ongoing research were obvious - students who chose to continue their internships participated in more complex experiments and contributed to faculty and researcher publications. We therefore chose to continue this portion of the project in 1994. The fall internships are funded with residual funds from previous years support.

The 1994 timetable for this program was similar in every respect to previous years administration and is listed below. One addition to this program was an orientation meeting for mentors.

May	Faculty position requests and job descriptions due in Dean's Office/RSMAS. UM administration of program carried out through this office. Job descriptions sent to MAST Academy program administrator.
May	Student applications due in MAST office. Applications checked for completeness by MAST staff.
May 30	Potential employers called and interviews scheduled. Faculty and scientist mentors called and interviews scheduled.
May 30- June 9	Applicant interviews at job sites based on criteria stated on applications.
June 10-30	Mentors notify MAST of applicant decisions.
June 10-30	Students are notified of placement. MAST orientation for students with emphasis on job skills.
July 1	Students report to Dean's Office/RSMAS for orientation and a tour of the Rosenstiel School and to complete paperwork related to hiring. Mentor orientation.
July 6 - August 19	Students report to the job site Monday through Friday (or as arranged with mentor).
August 19-31	Students make up missed days of work to complete 35-day assignment.
Sept - Dec	Fall interns continue working afterschool/weekends

The program administrator for the summer internship program at the MAST Academy conducted a post-internship survey to assist the University in both the preparation of this final report and in order to properly evaluate the effectiveness of this program (see Appendix C). The program was assessed in terms of its impact on participating students in the following areas:

- Subsequent career choice.
- Mentor contact.
- Job opportunities and employability.
- Academic standing and choice of curriculum.
- Environmental awareness.

As is shown by the preliminary results, a large proportion of the interns report a positive influence on their high school grades after the internship. This has been the most consistent result of this program; in fact several of the interns from each summer program, throughout the nine years of this program, have decided that science is the career they want and made plans to attend either the University of Miami Undergraduate Marine Science or Environmental Sciences Program, or a similar program at another university or college.

Many of the interns, especially those who found the summer intern experience stimulating or enriching, are taking or plan on taking advanced science courses including advanced placement biology, chemistry and physics. Those who do not plan on taking advanced science courses generally fall into three categories: those who find that science is "harder" than they expected and seem daunted by the amount of work involved in both studies and actual research; those who find it less interesting than expected (a very small proportion of the respondents); and those who do not have these types of courses available at the school they presently attend.

The role of the mentor has proven to be pivotal in the experience of the students; the goal of the program is not only exposure to laboratory techniques but to those marine scientists who are willing to serve as active role models for these students. There are several scientists who have shown a special willingness to train and educate by example and who open their research activities for these summer interns each year. The students cite these mentors' accessibility and patience and their willingness to communicate about the research being done as the most positive aspect of this student-mentor relationship. Another very positive aspect of the student-mentor relationship occured when young women served their internship with a woman scientist or the Hispanic students had contact with Hispanic scientists. The student-mentor relationship is further enhanced by regular communication with both the RSMAS and MAST staff coordinators who monitor progress of skill development, interpersonal relationships and work skills. This element of the program contributes to mentor involvement - the students provide enthusiasm and an eagerness to learn and experience. They also show great appreciation for the contact and mentoring provided by program administrators and scientists.

In past years we have made note of the continued contact between students and mentors after the summer internship has ended. It is usually these interns (who maintain contact with their mentors) who return for a second summer in the program. Because this contact has been such a consistently positive result of intern program, these past two years there was the additional option to continue an internship into the fall semester. Not only did the students benefit from additional training and skill development during these additional months, but the mentors were able to have better trained individuals working in their labs. The time the mentors spent training an intern thus gave them a greater return on their investment of time, with the option to prolong the internship into the fall months.

In all cases where the administrators of the program have had personal communication with the student interns, there is a sense of excitement and interest in the sciences. More and more of the interns are entering and winning local (county) science fair awards; several of the interns have gone on to the state competition. The highest proportion of interns who choose science as their intended major in college have participated in the intern program a second year or chose to continue their internship in the fall semester. Of particular note is the correlation between those students who participate in the intern program and their acceptance at universities of excellence - one mentor this summer was being recruited by MIT, another by Harvard; a third, an Afro-American student, has been accepted as a science major with full scholarships at four universities. The mentoring process can thus be said to have a direct connection to subsequent career and academic choices.

This intern program was initially created primarily to provide disadvantaged or minority high school students with the opportunity for direct science research experience as a means of stimulating interest in the science. At this point it is specifically aimed at high school students to serve as an academic stimulus in the pre-college years. A perusal of the data gathered in the nine years of this program supports the yearly evaluation that this approach is effective in achieving its programmatic goals. A substantial proportion of the students not only benefit academically from their participation, but are exposed to a more realistic experience of what a marine science career entails, including the physical requirements of laboratory and oceanographic research. The interns who work at the Rosenstiel School are also exposed to the academic environment in a direct way through their contact with graduate students and professors. Through this contact, the high school interns have a more realistic sense of the length of studies and level of expertise required for a career in marine science. Lastly, by providing this educational stimulus to students from ethnic, social or economic backgrounds that are under-represented in the field of science (black, female and Hispanic) this program fulfills a national mandate to promote increased academic excellence in math and the sciences among American youth, as well as providing more opportunities to minority and disadvantaged youth.

In the early years of the program the intent was to provide opportunities for inner city youth in marine sciences and was administered jointly with the Dade County Public School System as the "Inner City Marine Program". This partnership formed between Dade County Public Schools and the University of Miami is one of the most important aspects of this program -- for it benefits both students and the community, especially disadvantaged or minority students, by effective coordination of local educational resources. Though the focus of the program has shifted in the past three years from being primarily for inner city youth, the program still serves to attract a large percentage of black and Hispanic students (at least 50% of the interns), thus continuing to provide this much-needed opportunity to those economically disadvantaged. It is another indication of the success of the program that career opportunity and job eligibility have been inproved for these students.

This program had such continued success in achieving its goals that it was incorporated into the curriculum of the newly formed MAST Academy (a marine science and technology high school) as a summer intern program. The focus has evolved through the years to include a stronger emphasis on academic excellence and exposure to oceanographic science (though it still serves its original purpose as an outreach opportunity for disadvantaged youth, accepting applicants from public and private high school students in Dade and Broward County).

Students at the MAST Academy are fortunate to have a greater exposure to the many and varied branches of marine science and better training in basic laboratory techniques than most high school students, but many of the students who apply to this program do not have such an advanced science curriculum in their school. This program has been very effective, therefore, in identifying local students with a predilection for science and giving them the opportunity to experience many of the possibilities that exist in the oceanographic community for various types of research. The summer internships thus serve as an extension of the high school experience, opening up many previously unknown academic and career possibilities to those students who have already proven they are capable of achieving academic excellence and realization of their goals.

Another positive result of the program is a greater environmental awareness on the part of these students. The exposure to scientists in general, and oceanographic scientists in particular, allows the students to explore specific aspects of the marine ecosystem not usually experienced in high school, among them an awareness of the actual effects of development on the environment. By working in a coral reef laboratory, or with phytoplankton samples, or assessing data on coastal properties, these students gain specific knowledge of the natural world, the negative effects of urban development and the polluting factors associated with it (e.g., raw sewage spills in local waters). A consistent result of the summer internships seems to be a heightened awareness of some of the local environmental problems that exist. A secondary effect of this increased

awareness may be career or academic choices related to the fields of ecology, environmental law, or marine and coastal policy.

This program has also been a success in providing experiences that improve job eligibility. Follow-up contact with former summer interns has shown that not only do many of these students feel more qualified to pursue jobs within the oceanographic and science community, they actually have gained some of the needed skills to perform well at these jobs. Several of the former interns are currently employed at the University or at the NOAA/AOML laboratory. We credit this program with providing these students with necessary research skills and an understanding of new procedures. Indeed, many of the mentors note a maturation process in these high school students when exposed to graduate students, researchers and staff members during their internship.

It is important to note that after eleven years duration this program and its continued success have become an incentive for middle school students as a known reward for academic excellence in the maths and sciences. Students relate that they look forward to participating in this program in their junior and senior years, and thereby gain a competitive academic edge during the final years of high school (for as noted above, student participation in this program has been shown to improve grades and laboratory skills and thus improve a student's chances of being accepted by the college program of their choice). This program has, in part because of its long term duration, become an important part of the improved science curriculum in the Dade County Public School system. In fact, its continued success at stimulating student interest in the sciences has indirectly led to the initiation of similar programs in other academic areas. The MAST Academy, for example, has submitted a joint proposal with RSMAS/UM to the GLOBE program for participation in a global environmental experiment. We feel that the prior success of student/scientist interactions in programs such as this summer intern program will serve as a continued outreach to stimulate interest in the maths and sciences among students.

APPENDIX A

JOB DESCRIPTIONS

FOR

MAST ACADEMY OUTREACH PROGRAM

SUMMER MARINE AND ENVIRONMENTAL SCIENCE
INTERNSHIP PROGRAM

July 1 through August 19, 1994

SUMMER INTERNSHIP PROGRAM

JOB DESCRIPTION

MAST Academy
3979 Rickenbacker Cswy
Miami, Florida 33149

Position Title Research Assistant Hours _____

Agency _____

Job Site Address Univ. Miami, RSMAS, 4600 Rickenbacker Cswy

Division of Marine Biology & Fisheries

Immediate Supervisor Dr. Todd Hopkins Phone 361-4856

Agency Contact Person _____ Phone _____
(If different from immediate available)

Number of positions available 1

Minimum Age _____

Special Requirements _____
(ie skills, course prerequisites, etc...)

Salary/Stipend _____

Dress Requirements _____

JOB DESCRIPTION

Assist with a study of urea production in gulf toadfish (*Opsanus beta*). Includes analyzing seawater samples, toadfish liver enzymes, taking length, weight and determining sex on fish used in experiments. In addition the student is expected to help monitor experimental set-ups (temperature, salinity, treat fish for diseases), and can learn to anesthetize and take blood from fish. May include a couple of snorkeling trips in Biscayne Bay, possibly one night on a shrimp trawler in Biscayne Bay, and a day or two of field work in north Florida on the Gulf coast south of Tallahassee (I will be along on all these trips: travel, food & lodging will be supplied).

Helpful skills (not required): some lab experience (e.g. weighing, measuring, pipetting), some experience with fish. A willingness to learn new techniques is a must.

SUMMER INTERNSHIP PROGRAM

JOB DESCRIPTION

MAST Academy
3979 Rickenbacker Cswy
Miami, Florida 33149

Summer hours: 40 hrs/wk

Position Title Data Processing Assistant Hours 9-5
During school/part-time

Agency RSMAS

Job Site Address Meteorology & Physical Oceanography, Marine Science Ctr, 3rd fl

4600 Rickenbacker Causeway Miami FL 33149

Immediate Supervisor Elizabeth Williams Phone 361-4070

Agency Contact Person Dr. Tom Lee Phone
(If different from immediate available)

Number of positions available 1

Minimum Age 16

Special Requirements Algebra, computer skills
(ie skills, course prerequisites, etc...)

Salary/Stipend neat, casual dress

Dress Requirements neat, casual dress

JOB DESCRIPTION

This position is once where the main task will be data processing, however, this will not be the only task required. This position requires flexibility as the individual will be, at various points, running computer programs, doing investigative research tasks, helping prepare instruments for deployment in the field, analyzing data, and preparing data reports. A good grasp of algebra is helpful. The person in this position need not be a computer expert, but should be willing to become one. This position may include the opportunity for going to sea or field work (assuming permission of the program, the University of Miami and the student's guardians)

Symra 5-4711

SUMMER INTERNSHIP PROGRAM

JOB DESCRIPTION

MAST Academy
3979 Rickenbacker Cswy
Miami, Florida 33149

Position Title GEOLOGICAL AIDE Hours TBA

Agency UNIVERSITY OF MIAMI RSMAS MARINE GEOLOGY

Job Site Address 4600 RICKENBACKER CSWY.

Immediate Supervisor R.N. GINSBURG Phone 361-4875

Agency Contact Person _____ Phone _____
(If different from immediate available)

Number of positions available 1

Minimum Age 16

Special Requirements Prefer applicants with computer skills, but
(ie skills, course prerequisites, etc...) will consider others as well.

Salary/Stipend _____

Dress Requirements _____

JOB DESCRIPTION

---PREPARE AND DESCRIBE CORE SAMPLES OF FOSSIL REEF LIMESTONES USING MICROSCOPE AND STANDARDS. ENTER RESULTS ON COMPUTER PROGRAM AND COMPARE WITH LIVING REEF DISTRIBUTION.

SUMMER INTERNSHIP PROGRAM

JOB DESCRIPTION

MAST Academy
3979 Rickenbacker Cswy
Miami, Florida 33149

Position Title Lab Assistant Hours 40/wk

Agency RSMAS

Job Site Address E 6ROS Rm 211

Immediate Supervisor Dr. Alina Szmant Phone 361-4609

Agency Contact Person _____ Phone _____
(If different from immediate available)

Number of positions available 2

Minimum Age 17

Special Requirements Computer Skills, Biol + Chem
(ie skills, course prerequisites, etc...)

Salary/Stipend _____

Dress Requirements informal - shorts & t-shirts welcome

JOB DESCRIPTION

(1) assist with preparation and analysis of sediment samples
(2) ~~Analysis of~~ data entry into computer spreadsheets, and graphics programs.

SUMMER INTERNSHIP PROGRAM

JOB DESCRIPTION

MAST Academy
3979 Rickenbacker Cswy
Miami, Florida 33149

Position Title Office Staff Hours 3-4/day

Agency International Oceanographic Foundation

Job Site Address Rosenstiel School of Marine and Atmospheric Sciences
Virginia Key - Science Administration Bldg.

Immediate Supervisor Kurt Heinonen Phone 361-4888

Agency Contact Person Symma Finn Phone 361-4016
(If different from immediate available)

Number of positions available 1

Minimum Age 16

Special Requirements typing, filing, organizing and communication skills
(ie skills, course prerequisites, etc...)

Salary/Stipend

Dress Requirements Neat casual

JOB DESCRIPTION

Typing, filing answering the phone. Library research on a wide range of marine science and marine careers - related topics. Assist with giving guided tours of campus, including the fish hatcheries. Assisting with the operations of our international oceans-oriented travel-study program: Sea Safari. Basically, learn the operation of an education and research-oriented non-profit foundation.

SUMMER INTERNSHIP PROGRAM

JOB DESCRIPTION

MAST Academy
3979 Rickenbacker Cswy
Miami, Florida 33149

Position Title LAB ASST Hours _____

Agency RSMAS / Division of Marine Biology + Fisheries

Job Site Address Hatchery / ~~Sgrav.~~ 5312 - lab

Immediate Supervisor Joe Serafy Phone 361-

Agency Contact Person Symma Finn Phone 361-4016
(If different from immediate available)

Number of positions available 2

Minimum Age 16

Special Requirements biologically-inclined students
(ie skills, course prerequisites, etc...)

Salary/Stipend minimum wage

Dress Requirements very casual - will get wet + dirty

JOB DESCRIPTION

See attached

includes - night sampling from a boat
lab work processing samples

DATE: May 13, 1994.
FROM: Joe Serafy
TO: Symma Finn
SUBJECT: MAST Academy Needs

Attached two items: 1) a brief, lay description of our rollerframe sampling effort and goals; and 2) a more scientific description of some methods currently employed. This effrt will continue till at least September, 1994.

I need two MAST students to help out with: laboratory processing of shrimp and fish samples and possibly going out on the shrimping vessel bi-weekly (optional, but really impressive for the right people). I will also have some growth studies in the hatchery which require daily care and maintenance of red drum in tanks and weekly measurement of their sizes.

If you could interview two keen biologically-inclined students who like to get dirty, wet and want experience dealing with live animals I would be most grateful.

Sampling of epibenthic fish and decapod assemblages in Biscayne Bay

Description

We rely on the gear and vessels typically employed by South Florida's live bait shrimp fishery to sample epibenthic fish and decapod (i.e., shrimp, crab, and lobster) assemblages in Biscayne Bay. This effort was initiated July, 1993, by Dr. Joe Serafy to fulfill the "Habitat Assessment" component of the FL DEP's Gamefish Stock Enhancement project. This project required an analysis of potential interactions between released juvenile red drum (Sciaenops ocellatus) and the Bay's resident fauna. Evident from the onset was that other new and ongoing projects could benefit from the data obtained in this effort.

Paired "rollerframe" trawling has proven to be a relatively rapid, quantitative and non-destructive method for obtaining temporal and spatial data on the Bay's dominant epibenthic animals. Our monthly rollerframe sampling of eight locations continues to provide important information for: 1. Characterizing resident species as potential predators, prey and competitors of juvenile red drum (and proxies -- other drum species); 2. Comparing seasonal and historical changes in the density, biomass and diversity of epibenthic fish and invertebrate communities; 3. Obtaining autecological (i.e., species-specific) data on estuarine, lagoonal, and coral reef species which utilize Bay habitats as juvenile refuge and/or feeding areas; 4. Collecting size- and site-specific deformity prevalence information for several common fishes; and 5. Assessing the impact of the live shrimp fishery on both target (pink shrimp) and non-target species.

Sampling and analysis are now truly collaborative efforts in which Drs. Serafy, Gassman and Hopkins combine to maximize the quantity and quality of information gleaned on each collecting trip. Additional resources from Hatchery Manager Tom Capo and Drs. Walsh and Schmale will allow continuation of this effort through September, 1994, and possibly beyond.

Methods

The standard gear used to harvest live shrimp from the coastal bays in South Florida is the "rollerframe" trawl. This gear was towed from an licensed, operating commercial vessel in the present study. Towed in pairs from a 10.1m vessel with a shallow draft (i.e., 0.3m), rollerframe trawls measured 3m in width, 1m in height and 7m in length. As the name suggests, each rollerframe trawl consisted of a steel frame with one or more slotted rollers along the entire bottom edge. The net meshsize was 10mm. As the primary contact point with the bottom, the rollers were designed to allow the frame to roll over, rather than drag through, the substrate. Trawls also possessed metal or fiberglass bars, called "finger bars" which were spaced 30mm apart and extended vertically across the trawl mouth. The finger bars functioned to prevent large objects, such as coral rubble, large animals (e.g., turtles), and unattached benthic vegetation (e.g., Laurencia) from damaging the live catch.

Eight stations were selected and sampled monthly from July, 1993, to December, 1993. The station locations spanned much of the north-south axis of the Bay and all but one (i.e., Sunset Harbor) was located along the western shore of the Bay (Figure 1). From south to north, station names were designated as: Turkey Point, Black Point, Matheson Hammock, Grove Island (adjacent to Rickenbacker Causeway), Miami River, Little River, Sunset Harbor, and Oleta River (actually adjacent to Biscayne Canal).

Sampling was conducted exclusively at night (i.e., 1-2 h after sunset and 3-6 h before sunrise). For each month, two paired trawl samples were obtained at each site. For any given tow, trawl catches on either side of the vessel were kept separate, thus monthly N=4 for each site. At the beginning and end of each tow, location coordinates (i.e., latitude-longitude) and depth were obtained with a GPS unit and electronic depth sounder. Nominal tow time and speed were 10 min at 1.5 knots; actual trawl bottom time and speed measurements were recorded for each tow. During tows, a surface water sample was obtained and temperature, salinity and dissolved oxygen (DO) determined onboard using YSI water quality meters; to confirm salinity measurements, a 1 L subsample was taken to the laboratory and salinity determined using a refractometer.

Catches were first placed onto sorting tables and fishes and invertebrates separated from plant debris. All shrimps and crabs were placed directly in plastic bags and put on ice. Except for individuals not readily identifiable, all fishes were identified, measured (total length, TL) and released. In the laboratory: 1) retained animals were examined to confirm identifications; and 2) the carapace lengths (CL) of up to 100 shrimp were obtained for each sample. Individual weights of released fishes and decapods (and thus total catch weights) were estimated from both published and newly-generated weight-length relationships.

SUMMER INTERNSHIP PROGRAM

JOB DESCRIPTION

MAST Academy
3979 Rickenbacker Cswy
Miami, Florida 33149

Position Title Aquaculture Assistants Hours 20/wk

Agency University of Miami

Job Site Address University of Miami, Experimental Hatchery, Virginia Key

Immediate Supervisor Tom CAPO Phone 361-1037

Agency Contact Person _____ Phone _____
(If different from immediate available)

Number of positions available 2

Minimum Age 16

Special Requirements Biology background helpful
(ie skills, course prerequisites, etc...)

Salary/Stipend _____

Dress Requirements Very casual (WILL get wet)

JOB DESCRIPTION

Assist the Experimental Hatchery staff in the culture of marine fish, invertebrates (Aplysia) and algae. Daily animal husbandry tasks (feeding and tank cleaning). Perform water quality analysis. Small amount of record keeping.

SUMMER INTERNSHIP PROGRAM

JOB DESCRIPTION

MAST Academy
3979 Rickenbacker Cswy
Miami, Florida 33149

Position Title Hatchery assistant Hours flexible (can work weekends)

Agency UNIVERSITY OF MIAMI, RSMAS

Job Site Address 4600 Rickenbacker Causeway

Immediate Supervisor Cindy O'Brien/Sandrine Apelbaum Phone 361-1236 MORNING, 361-4670 AFTERNOON

Agency Contact Person _____ Phone _____
(If different from immediate available)

Number of positions available 3

Minimum Age 15

Special Requirements Basic background in biology, computer skills a plus
(ie skills, course prerequisites, etc...)

Salary/Stipend _____

Dress Requirements shorts and T-shirt are fine

JOB DESCRIPTION

Helps in aqua culture of fishes. Includes fish feeding, tank cleaning, algae culture.

MARINE AND ENVIRONMENTAL SCIENCE
INTERNSHIP PROGRAM

JOB DESCRIPTION

MAST Academy
3979 Rickenbacker Causeway
Virginia Key, Florida 33149

Position Title LAB. ASST. Hours _____

Agency ONR

Job site address RSMAS

_____

Immediate Supervisor F. MILLERO Phone 361-9707

Agency Contact Person _____ Phone _____
(If different from immediate Supervisor)

Number of positions available 1

Minimum Age 16

Special Requirements Computer, Chemistry
(ie: skills, course prerequisites,etc.)

Dress Requirements _____

JOB DESCRIPTION

Studies of the carbon dioxide system in seawater

SUMMER INTERNSHIP PROGRAM

JOB DESCRIPTION

MAST Academy
3979 Rickenbacker Cswy
Miami, Florida 33149

Position Title Student Assistant Hours 25-40

Agency University of Miami - RSMAS

Job Site Address Cimas Bldg, 1st FL, 4600 Rickenbacker Cswy

Miami, FL 33149

Immediate Supervisor Miguel McKinney Phone 361-4175

Agency Contact Person _____ Phone _____
(If different from immediate available)

Number of positions available 1-2

Minimum Age 16

Special Requirements Familiarity with Computers
(ie skills, course prerequisites, etc...)

Salary/Stipend _____

Dress Requirements Casual

JOB DESCRIPTION

Student to assist in all aspects of Oceanographic Operations - Technical equipment preparation for research cruises, record keeping, some typing, filing, possibility of participating in research cruise as Marine Technician's assistant.

APPENDIX B

LETTERS OF SUPPORT

and

"BEYOND THE CALL" AWARD NOMINATIONS

of

1994 SUMMER INTERNS

UNIVERSITY OF Miami

DATE: August 9, 1994
FROM: Dr. Joe Serafy, Research Associate
TO: Ms. Symma Finn
SUBJECT: MAST Academy Summer Internship Program

This is my second consecutive summer of involvement as mentor in the MAST Academy Summer Internship Program. I currently have the benefit, and distinct pleasure, of working with interns Tim Curtis and Jorge Pupo.

Once again, my research has been both enriched and substantially advanced by intern participation. In my experience, intern enthusiasm, dedication, energy, and intelligence match (and sometimes exceed) my undergraduate assistants'. The end product from my standpoint is an expanded, dependable summer research team capable of "moving mountains" whether in the laboratory or in the field. Frankly, the help provided by the program advances my own career. I wish the program, or some modification thereof, was instituted on a year-round basis.

Suffice it to say, should monies allow, I would be delighted if I could extend the stay of at least one of my current interns beyond August 19th. Should you require any further comments, impressions, suggestions, or information, please don't hesitate to contact me.

Rosenstiel School of Marine and Atmospheric Science
Division of Marine Biology and Fisheries
4600 Rickenbacker Causeway
Miami, Florida 33149-1098
(305) 361-4151
Fax (305) 361-4600

UNIVERSITY OF
Miami

Ms. Symma Finn
Administrative Assistant
Office of the Assistant Dean
Rosenstiel School of Marine & Atmospheric Science
University of Miami

19 August 1994

Re: MAST Academy Summer Internship Program

Symma,

First, let me thank you for the opportunity to be a mentor in the summer internship program. This program has been tremendously rewarding experience for me, and judging from the enthusiasm of my intern, Heidy Frank, I think she would agree. Heidy assisted me in collecting fish in the field and in analyzing samples and conducting experiments in our laboratory. She was very quick at learning new methods and, more importantly, she was consistent in her technique and use of various instruments.

In conjunction with Dr. Joe Serafy, I devised a small, but important experiment to determine if certain species of Biscayne Bay fishes can tolerant of rapid declines in salinity like those that occur at the mouths of canals. Dr. Serafy and I briefed Heidy and Tim Curtis (Dr. Serafy's intern) on our justification, and gave them some pointers on using the scientific method to approach a problem (research question). We then let them work out the bugs in a design sketched (literally) on a piece of scrap paper and asked them to create an experimental protocol. In a matter of days, these two had refined our design and run several preliminary test on this system (without fish in it). In addition, they gone to the RSMAS library, and found research articles and books relevant to this experiment. Thery presented Joe and I with their preliminary results, and some references and a few suggestions on how to improve the experiment. Quite frankly the caliber of the work was worthy (if not better) of a first year graduate student. Dr. Serafy and I are considering adding Heidy and Tim as authors for the paper we intend to write from this experiment.

Rosenstiel School of Marine and Atmospheric Science
Division of Marine Biology and Fisheries
4600 Rickenbacker Causeway
Miami, Florida 33149-1098
(305) 361-4151
Fax (305) 361-4600

This program gives high school students a big head start into the world of science and research - something I wish I'd been able to do. The program is well run and the rules and expectations are clearly laid out in the mentor's briefing and in the handbook. You have been in touch with me regarding Heidy and her performance several times to be sure all is running well and there are no problems. If I had to give the program an overall grade it would definitely be an A. Next year I want two interns!

Sincerest thanks for allowing me to participate,

Todd E. Hopkins

Todd E. Hopkins, Ph.D.
Post-doctoral Research Associate

UNIVERSITY OF Miami

September 7, 1994

Brian Repoza
Mast Academy
3979 Rickenbacker Cswy.
Miami, FL 33149

Dear Brian,

Where can I find another Raymond Luk? He did a first-rate job for us during the summer, one of the most committed youngsters I have seen in some time.

I wish that I had been able to spend more time with Raymond, but I hope that he gained some idea of how geologists think.

Sincerely,

Robert N. Ginsburg
Professor of Marine Geology

RNG/knf

Rosenstiel School of Marine & Atmospheric Science
T. Wayland Vaughan Laboratory for Comparative Sedimentology
Mailing Address: University of Miami, RSMAS / MGG
4600 Rickenbacker Causeway
Miami, Florida 33149-1098
(305) 361-4684 or 361-4875
Fax (305) 361-4632
Telex 7401484

UNIVERSITY OF Miami

Ms. Symma Finn
Administrative Assistant
Office of the Dean
UM - RSMAS

10 February 1995

Symma,

Dr. Joe Serafy and I are each preparing a paper for submission and need the ONR grant number(s) for the program "*Partial Support of MAST Academy Outreach Program*" which allowed us to have MAST Academy interns this past summer. My intern (Heidy Frank) and one of Dr. Serafy's interns (Tim Curtis) were such an integral part of the research performed that we will be including them in the acknowledgements of these two publications. We need the grant number(s) to properly credit the ONR program as their source of support. Once again I'd like to thank you (and ONR) for this excellent program, as it has been invaluable for my research program.

While this may be a bit early, I'd like to ask for 2 interns this summer if/when the ONR program comes through. The work that Heidy and Tim performed has jumpstarted some of my and Dr. Serafy's research for a recently funded NOAA study entitled: *Human-Environment Linkages in the South Florida Ecosystem: Effects of Natural and Anthropogenic Stressors*.

Finally, Heidy has told me that her interviews with Harvard, Duke and Stanford went especially well because of her research experience though this program. I think her good fortune is a credit to your efforts in the ONR-MAST program.

Sincerely,

Todd E. Hopkins, Ph.D.
Postdoctoral Research Assoc.

cc: J. Serafy

Rosenstiel School of Marine and Atmospheric Science
Division of Marine Biology and Fisheries
4600 Rickenbacker Causeway
Miami, Florida 33149-1098
(305) 361-4151
Fax (305) 361-4600

MAST ACADEMY
SUMMER INTERNSHIP PROGRAM

"BEYOND THE CALL" AWARD NOMINATION FORM

The "Beyond the Call" Award is a monetary award given to students enrolled in the MAST Academy Summer Internship Program who have demonstrated ability and performance on the job that have far exceeded the original expectations of the work site supervisor, as well as the course requirements of the Internship Instructor. This form provides a means for work-site supervisors to nominate interns for this award.

(Please Print, Answer All Questions Completely)

Student Name Desirée Gonzalez

Work Location International Oceanographic Foundation

Supervisor Kurt Heinonen

Supervisor's Phone # 361-4888

Date student hired: June 20 1994

Average # of hours student works per week: 25-30

What are the student's job duties?: library research, correspondence, filing, xeroxing, membership database management

What is the student's job performance? (include: initiative, performance of required tasks, punctuality, communication skills, relationships with other employees, interest in the job, ability to work independently, etc.)

Desiree is an exceptionally hard-working young woman, very organized, poised, a good communicator, requires little to no supervision, has initiative and enjoys challenging tasks.

Student's job performance (continued)

She has increasingly offered suggestions for improvement w/ our mailings, reference lists and visual aids. Tasks she has taken on she has claimed as her province, thereby allowing me to do other things knowing she'll handle her duties with growing professionalism.

If the student is absent or late to work, does he/she let you know beforehand? Yes X No _____ Describe Only once did this not happen, then she called a bit late obviously very ill.

Describe any special accomplishments or projects initiated by the intern while on the job site: (use extra sheets, if necessary)

1. She went through our entire collection of Sea Frontiers magazine (dating to 1954) and created the magazine's first ever subject index.

2. Her research in the RSMAS library covered a wide range of marine science subjects and have directly contributed to our "Sea Secrets" answers in the magazine (this August and next October issues).

I highly recommend that the above student be considered for the MAST Academy Summer Internship "Beyond the Call" Award.

Kent C. Weinheimer
Supervisor's Signature

8/4/94
Date

Please return completed form by Friday, August 5 to Brian Rapoza, MAST Academy. The FAX number is 361-0996.

FOR THE ADVANCEMENT OF SCIENCE RESEARCH AND KNOWLEDGE OF THE OCEAN

THE INTERNATIONAL OCEANOGRAPHIC FOUNDATION
4600 RICKENBACKER CAUSEWAY, P.O. BOX 499900, MIAMI, FLORIDA 33149-9900
Telephone: (305) 361-4697
IOF SEA SAFARIS

3. I went on a brief business trip and turned the office over to Desiree (under the supervision of Ms. Finn). She in effect "ran" the IOF for this period of time.

Desiree has been a big reason I have been able to resurrect the IOF as an active, contributing and often-utilized marine science education and research support non-profit. She has sent literally hundreds of articles, reference lists and "Training and Careers" pamphlets to teachers and students. I think it is ironic, indeed, that a MAST student should have become so integral to the IOF so quickly – considering the long-standing ties between MAST, IOF and RSMAS.

Desiree has done more than just put in time, worked hard, performed her duties well, and been a pleasure to work with — she has come to care for the IOF and our mission.

Thank you. K. C. Heinrich

MAST ACADEMY
SUMMER INTERNSHIP PROGRAM

"BEYOND THE CALL" AWARD NOMINATION FORM

The "Beyond the Call" Award is a monetary award given to students enrolled in the MAST Academy Summer Internship Program who have demonstrated ability and performance on the job that have far exceeded the original expectations of the work site supervisor, as well as the course requirements of the Internship Instructor. This form provides a means for work-site supervisors to nominate interns for this award.

(Please Print, Answer All Questions Completely)

Student Name MATTHEW WILLSE

Work Location RSMAS - DR. ALINA SZMANT

Supervisor Maia McGuire

Supervisor's Phone # 361-4642

Date student hired: 6/14

Average # of hours student works per week: 40

What are the student's job duties?: Matt is assisting me with my research on coral reproduction + larval settlement, and is helping analyze data which will be used to compare different reefs in Biscayne National Park.

What is the student's job performance? (include: initiative, performance of required tasks, punctuality, communication skills, relationships with other employees, interest in the job, ability to work independently, etc.)

Matt is a very conscientious, organized worker. Despite a limited previous exposure to marine biology,

Student's job performance (continued)

he has shown a keen interest in the various projects and the desire to understand the significance of the data he is collecting. He works efficiently and can be left to complete tasks unsupervised. He gets along well with everyone in the lab + is a valuable asset.

If the student is absent or late to work, does he/she let you know beforehand? Yes ✓ No _____ Describe _____

Describe any special accomplishments or projects initiated by the intern while on the job site: (use extra sheets, if necessary)

Matt's organizational skills have served him well in our lab. Besides physically organizing our workshop, he created a spreadsheet to organize + analyze some coral recruit growth data for me. I simply gave him the raw data, told him what I wanted to know as the end result and he created the spreadsheet. He has also been largely responsible for maintaining sediment

I highly recommend that the above student be considered for the MAST Academy Summer Internship "Beyond the Call" Award.

M. P. McGuire
Supervisor's Signature

8/4/94
Date

Please return completed form by Friday, August 5 to Brian Rapoza, MAST Academy. The FAX number is 361-0996.

Matthew Willer - "Beyond the Call" award nomination (cont.

sample data from 72 samples with 5 size classes within each sample.

Matt has discovered that there is a handyman within every marine biologist — he has helped cut and glue PVC + coral slabs, and has helped make settlement plates for corals, sediment traps, dive slates + coral larvae collectors. He completes every task quietly and thoroughly.

MAST ACADEMY
SUMMER INTERNSHIP PROGRAM

"BEYOND THE CALL" AWARD NOMINATION FORM

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(Please Print, Answer All Questions Completely)

Student Name DAVID WHITLING

Work Location RSMAS - DR. ALINA SZMANT

Supervisor Maia McGuire

Supervisor's Phone # 361-4642

Date student hired: 6/14

Average # of hours student works per week: 40

What are the student's job duties?: Dave is assisting with 2 ongoing projects in our lab, one involving coral reproduction + larval recruitment, and one involving studying differences in sedimentation at different reefs in Biscayne National Park.

What is the student's job performance? (include: initiative, performance of required tasks, punctuality, communication skills, relationships with other employees, interest in the job, ability to work independently, etc.)

Dave is always enthusiastic and interested in his tasks - he asks for suggested reading to improve his understanding

Student's job performance (continued)

of the areas he is studying. He manages to complete tasks quickly, yet thoroughly. He will ask questions to clarify things he does not completely understand. He shows an interest in knowing why he is doing the tasks. He is cheerful + gets along well with everyone in the lab.

If the student is absent or late to work, does he/she let you know beforehand? Yes ✓ No _____ Describe _____

Describe any special accomplishments or projects initiated by the intern while on the job site: (use extra sheets, if necessary)

Dave has shown the ability to work unsupervised and has been left to complete many projects with his co-worker, Matt Willse. One extremely tedious project that both young men have been working on (without complaints!) is the compilation of a single master reference list from the Literature Cited sections of Alina's recent papers + proposals. Dave's computer skills (especially WordPerfect) have proved to be a

I highly recommend that the above student be considered for the MAST Academy Summer Internship "Beyond the Call" Award.

M.P. McGuire
Supervisor's Signature

8/4/94
Date

Please return completed form by Friday, August 5 to Brian Rapoza, MAST Academy. The FAX number is 361-0996.

David Whitling - "Beyond the Call" award nomination (cont.)

great asset on this task.

Dave showed his creativity in helping to design a method to remove sediment from sediment traps. Five people were trying to come up with an efficient method to do this. Dave took apart a Water Pik + re-wired it in an attempt to create a means of removing water from several samples at the same time.

APPENDIX C

MAST ACADEMY OUTREACH PROGRAM

MARINE & ENVIRONMENTAL SCIENCE INTERNSHIPS

ANNUAL CAREER FOLLOW-UP SURVEY

1994

PRELIMINARY REPORT

1994
MAST ACADEMY OUTREACH PROGRAM
ANNUAL CAREER FOLLOW-UP SURVEY REPORT
SUMMER INTERNSHIP PROGRAM

OVERVIEW

A total of 22 senior high school students were placed in internship positions funded through the University of Miami, including positions such as hatchery assistant, geological aide and hurricane team assistant. Of the 22 students, 14 were placed with scientists or administrative staff at the Rosensteil School of Marine and Atmospheric Science of the University of Miami, 4 at the Atlantic Meteorological and Oceanographic Laboratory (NOAA), and 4 at the Southeast Fishery Center (NMFS).Ten of the interns were from MAST Academy, while four attend other Dade County high schools, and consisted of 7 Blacks, 6 Hispanics, 8 Whites, 1 Asian, 13 males and 9 females. Nineteen of the twenty-two students responded to the survey.

SUMMARY OF FINDINGS

Surveys indicate that the internship program is having a significant influence on student attitude towards science; 68% of students have indicated that their experience has led to a greater appreciation of science. This increase appears to have resulted in changes in career plans among many of the interns. Though 58% of students were already planning careers in science even before they began their internship, by the program's conclusion, the number of students considering science careers had increased to 68%.

Almost half of the students indicated that their mentors have had a influence on their career plans. Many of the mentors have provided students with support for college applications (53%), while 42% have recieved offers for either part-time or full-time employment.

A majority of students indicate that the program has had a positive influence upon overall school performance, with 53% indicating a positive effect on grades, 58% indicating a positive effect on conduct, and 53% indicating a positive effect on their attitude even towards courses other than science.

Fourteen of the students who submitted surveys will be graduating from high school this year, and as such are not eligible for the program next summer. Of the students eligible to participate next summer, all have expressed an interest in returning.

1994
MAST ACADEMY OUTREACH PROGRAM
ANNUAL CAREER FOLLOW-UP SURVEY REPORT
SUMMER INTERNSHIP PROGRAM

These survey results were gathered from students participating in the 1994 summer internship program.

The survey included questions of two types. Questions A, and J were either general information or related to curriculum planning for class days at MAST Academy. All other questions were intended to assess program impact on participating students. Results are tabulated on the chart below.

Question/Information	Responses
Number of survey completed	19/22 (86%)
B. Were you planning a career in science before your internship?	
Yes	11/19 (58%)
No	8/19 (42%)
C. Are you now planning a career in science?	
Yes	13/19 (68%)
No	6/19 (32%)
D. Has there been continued contact with your mentor since last summer?	
Yes	6/19 (32%)
No	13/19 (68%)
E. Have these mentor contacts influenced your career choices?	
Yes	9/19 (47%)
No	10/19 (53%)
F. Have you been offered any additional opportunities as a result of these contacts?	
Job offers	5/19 (26%)
Support for college applications	10/19 (53%)
Full-time employment	1/19 (5%)
Part-time employment	7/19 (37%)
Assistance with science fair projects	6/19 (32%)

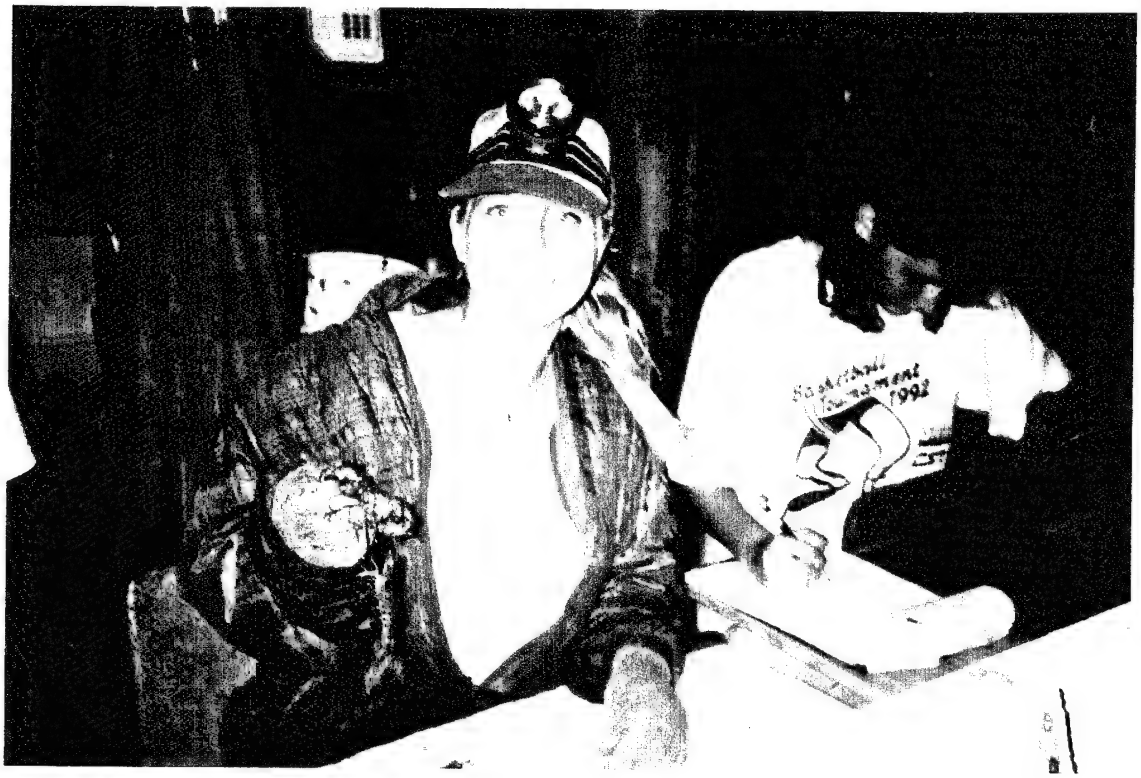
G. As a result of the intern experience, have you participated in any of the activities listed below?	
1. Science/Environmental Clubs	7/19 (37%)
2. Hiking	0/19 (0%)
3. Canoeing	1/19 (5%)
4. Camping	2/19 (11%)
5. Snorkeling	5/19 (26%)
6. Scuba Diving	0/19 (0%)
7. Fishing	4/19 (21%)
8. Sailing	0/19 (0%)
9. Boating	5/19 (26%)
10. Swimming	3/19 (16%)
H. Has your internship experience positively influenced your progress in school in any way?	
1. Grades	10/19 (53%)
2. Conduct	11/19 (58%)
3. Attendance	9/19 (47%)
4. Attitude towards school	9/19 (47%)
5. Attitude towards science	13/19 (68%)
6. Attitude towards other subjects	10/19 (53%)
I. Have you taken or are you planning to take additional science courses as a result of your internship experiences?	
Yes	5/19 (26%)
No	14/19 (74%)
K. Has your interest in environmental issues changed as a result of your internship experience?	
Yes	15/19 (79%)
No	4/19 (21%)
L. Are you interested in participation next summer?	
No, I am graduating high school and am not eligible.	14/19 (74%)
Still eligible	5/19 (26%)
Yes, please contact me.	5/19 (26%)
No, I am not interested.	0/19 (0%)

APPENDIX D

PHOTOS OF STUDENTS SERVING

MARINE & ENVIRONMENTAL SCIENCE SUMMER INTERNSHIPS

1994



ting vessel, 2 am

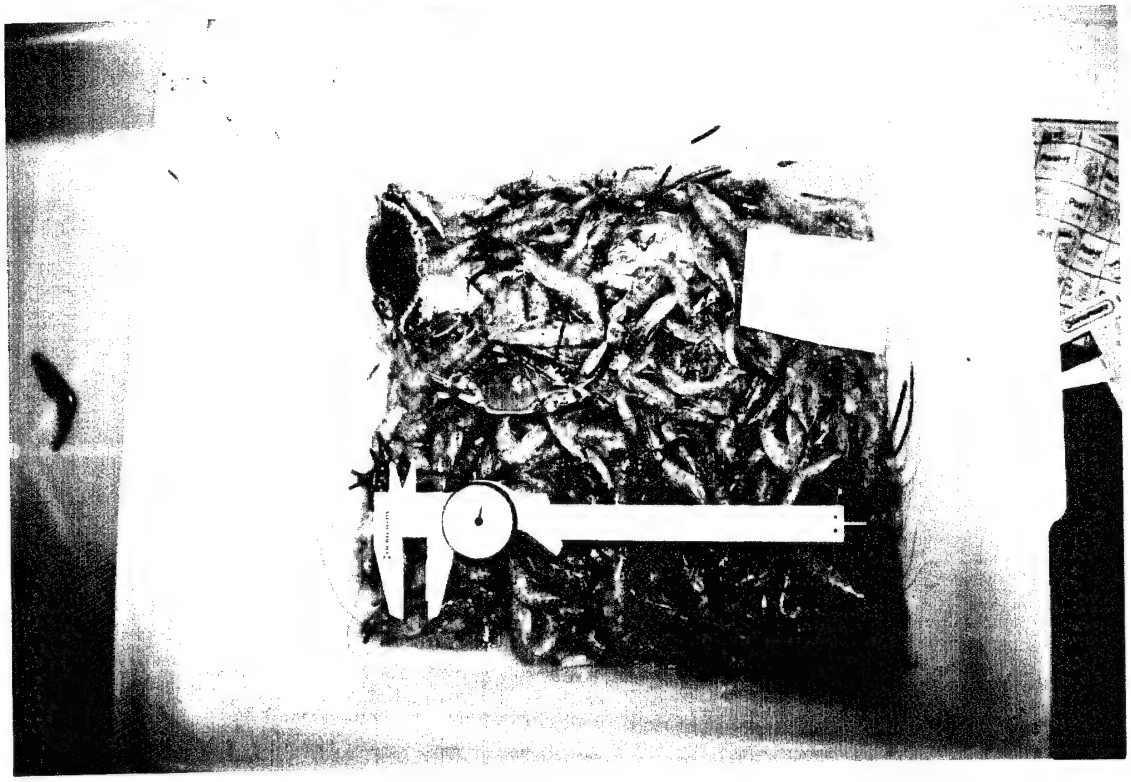
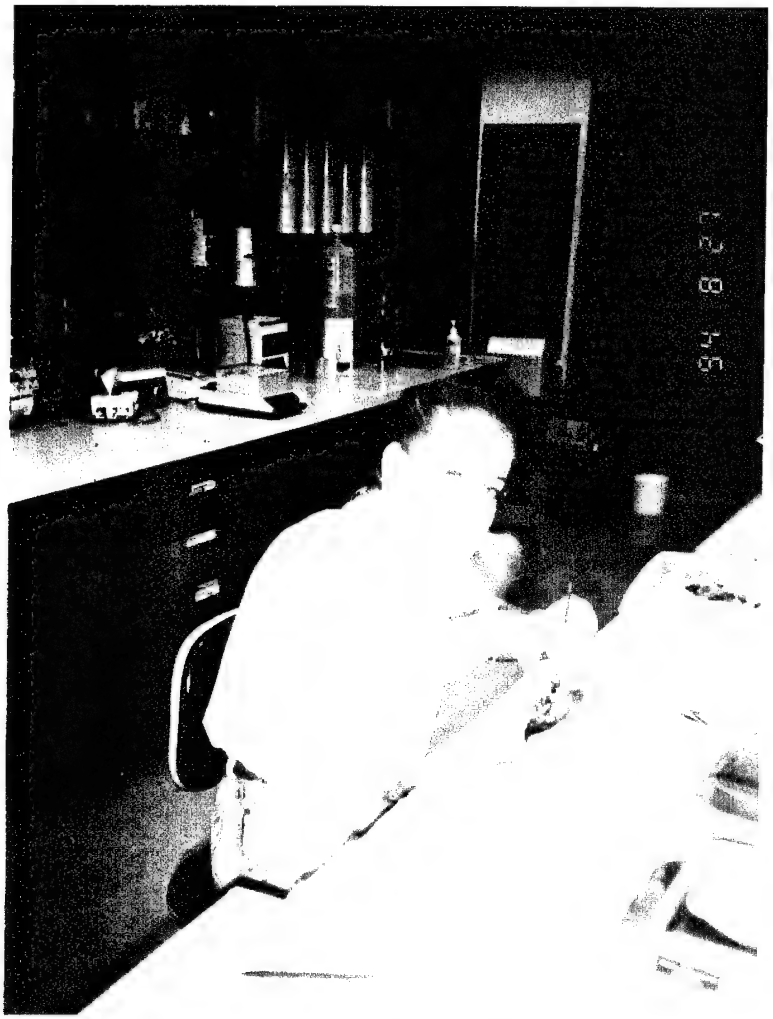


FIGURE 1: Student mentors Drs. Nancy Gassman and Todd Hopkins on board colle
FIGURE 2: Shrimp measuring equipment
FIGURES 3-4: Student interns at work measuring shrimp and recording data



y laboratory

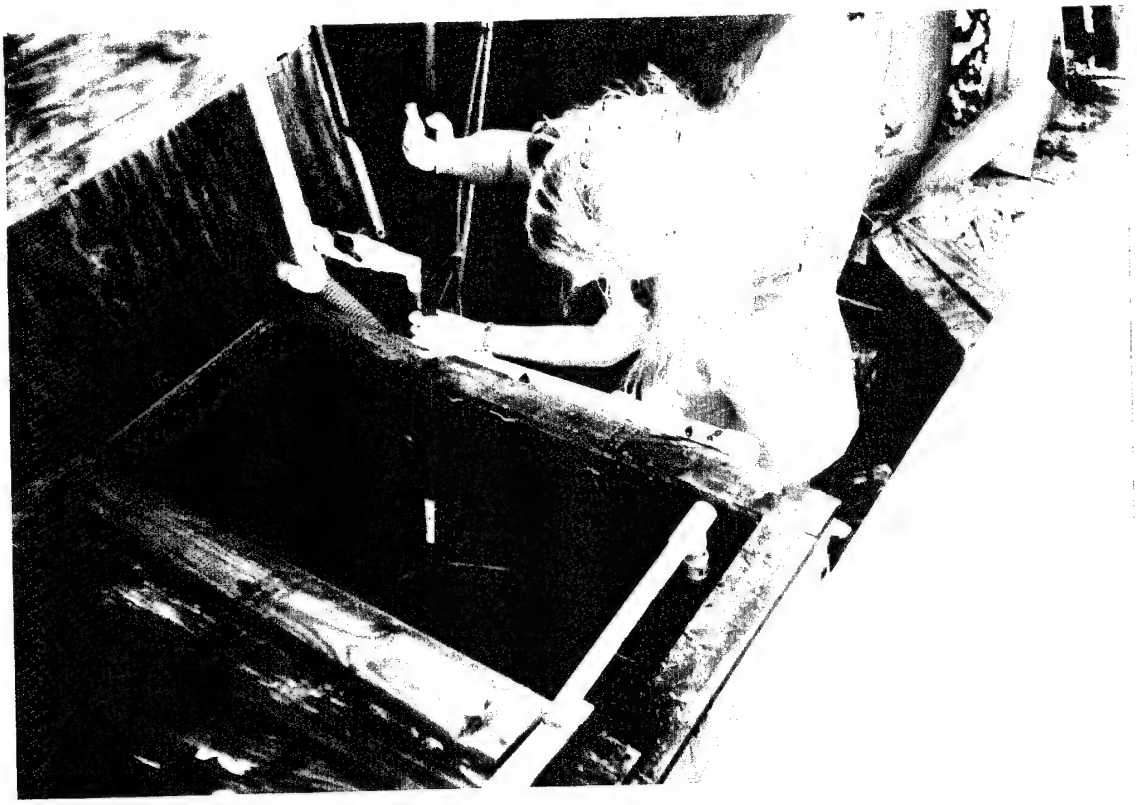


FIGURE1: Selecting toadfish at bait shop
FIGURES 2-4: Student intern dissecting toadfish in Dr. Patrick Walsh's marine biolog

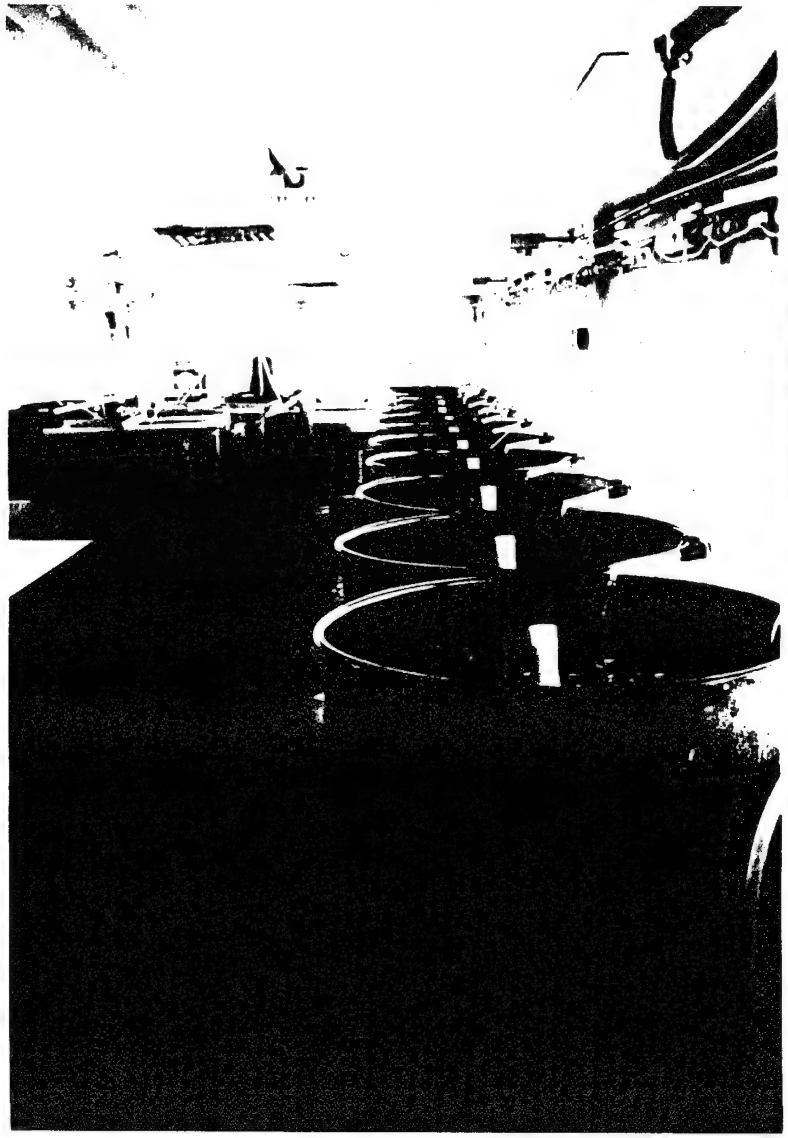
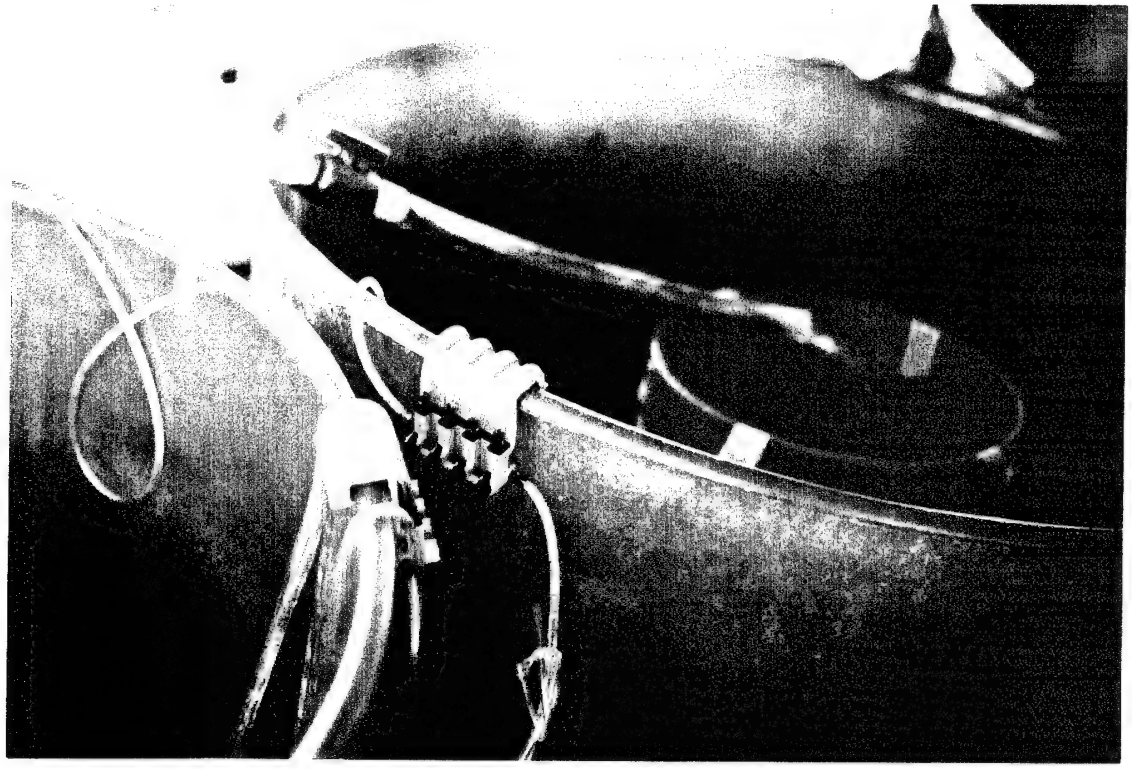
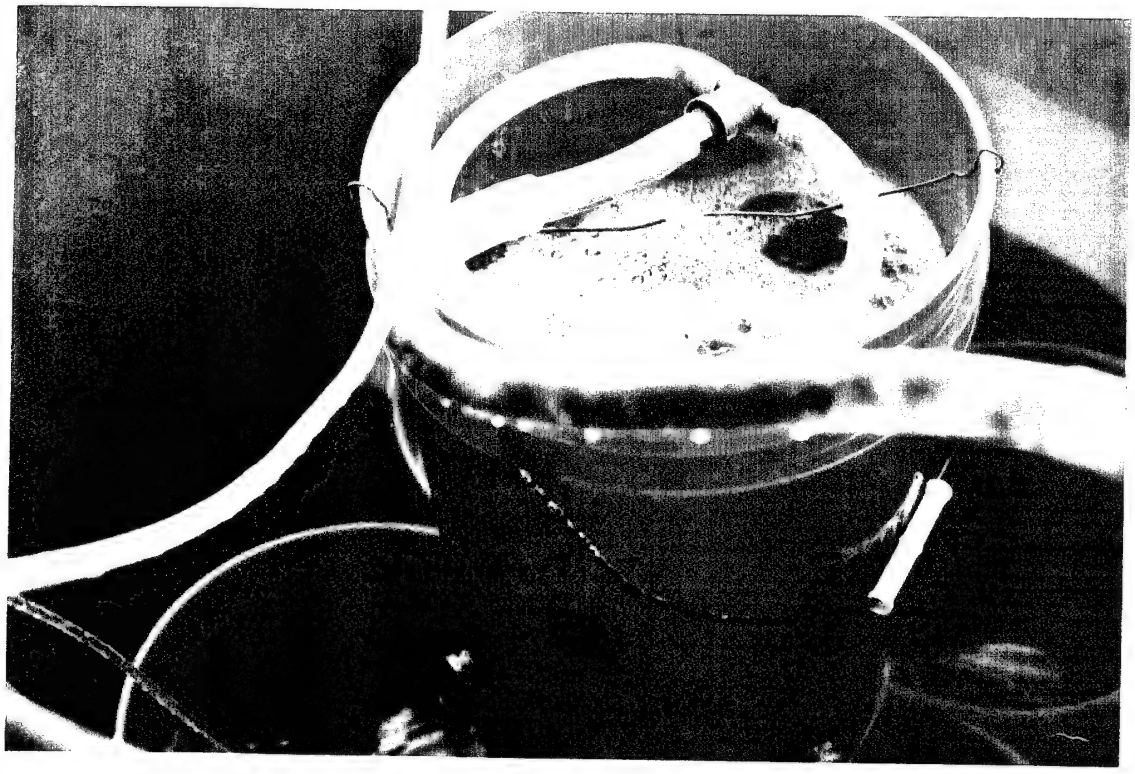
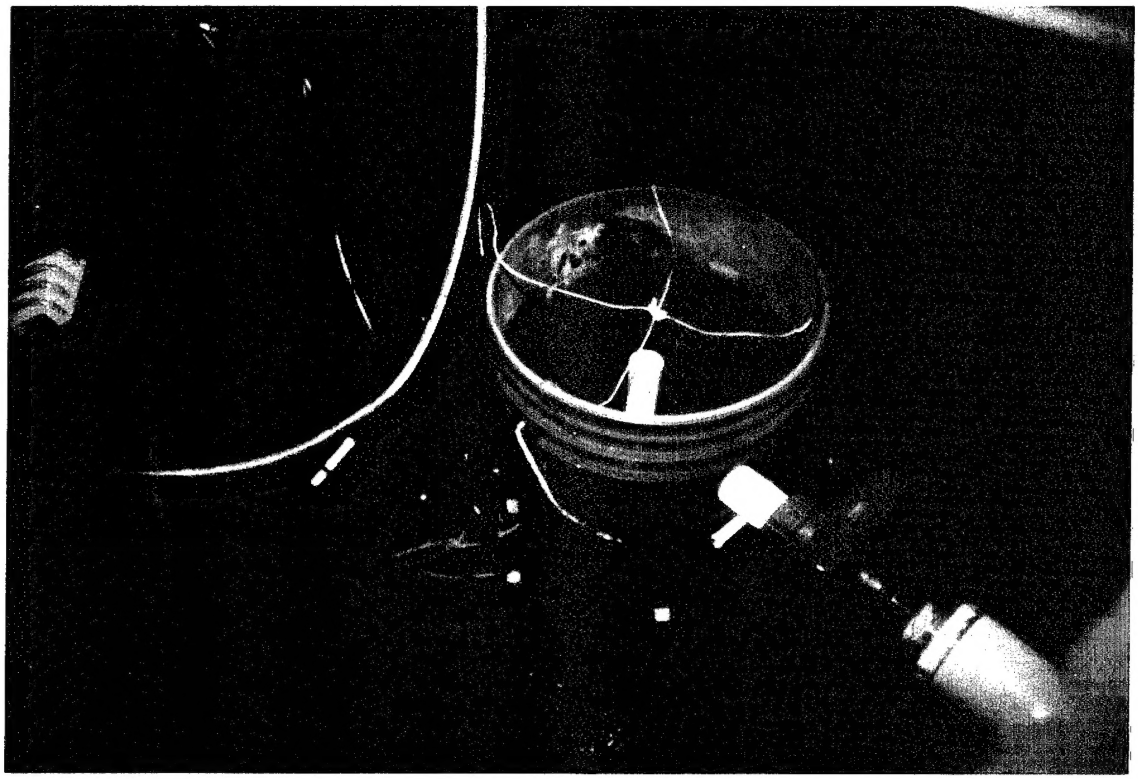


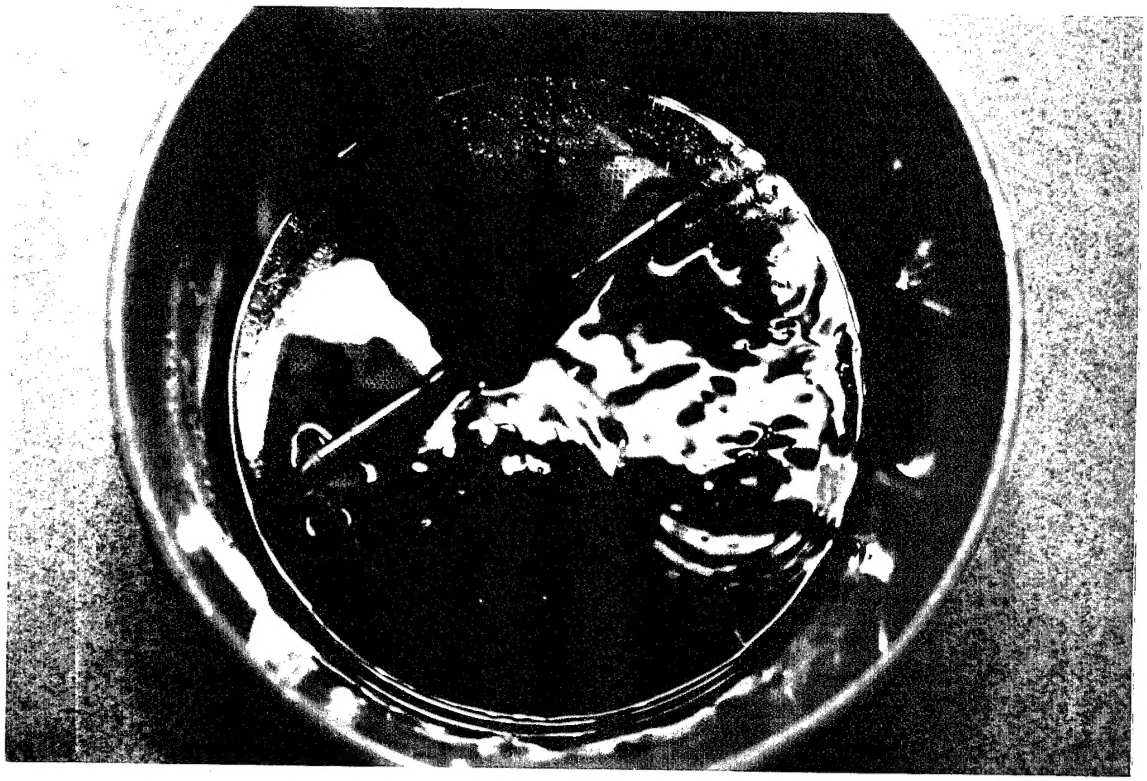
FIGURE 1: Fish storage tanks containing pinfish, toadfish and red drum- Experiment Fish Hatchery, RSMAS/UM
FIGURE 2: Red drum stored in formaldehyde - used in studies of larval development



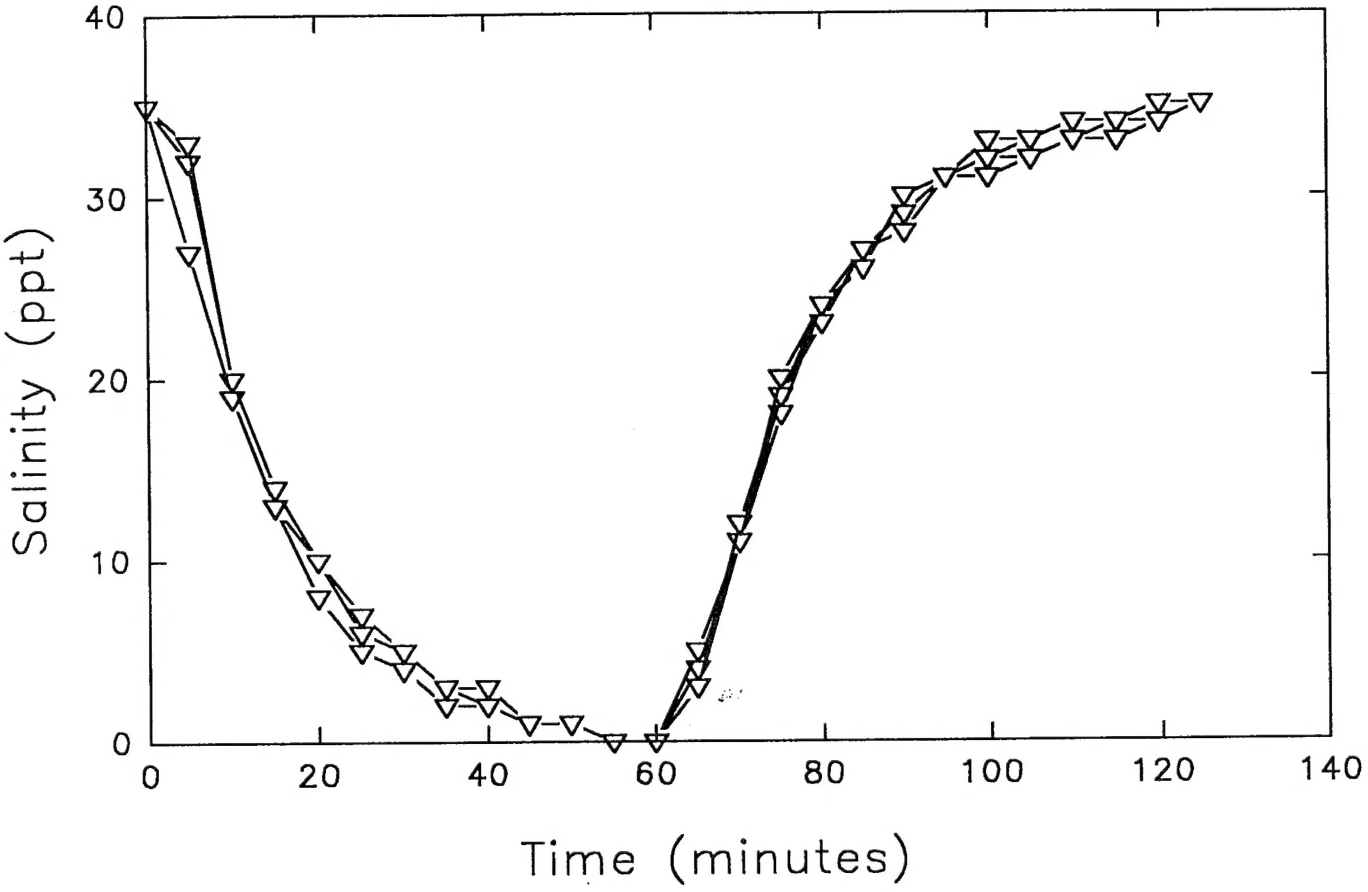


FIGURES 1-4: Student devised salinity experiment





Salinity Stress Experiment



Summer Intern designed experiment 1994

OFFICE OF THE UNDER SECRETARY OF DEFENSE (ACQUISITION)
DEFENSE TECHNICAL INFORMATION CENTER
CAMERON STATION
ALEXANDRIA, VIRGINIA 22304-6145

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SUBJECT: Distribution Statements on Technical Documents

TO: "PARTIAL SUPPORT OF MAST ACADEMY OUTREACH PROGRAM"
N00014-89-j-3172

1995 1031 020

1. Reference: DoD Directive 5230.24, Distribution Statements on Technical Documents, 18 Mar 87.

2. The Defense Technical Information Center received the enclosed report (referenced below) which is not marked in accordance with the above reference.

3. We request the appropriate distribution statement be assigned and the report returned to DTIC within 5 working days.

4. Approved distribution statements are listed on the reverse of this letter. If you have any questions regarding these statements, call DTIC's Cataloging Branch, (703) 274-6837.

FOR THE ADMINISTRATOR:

for Norman Nattras
GOPALAKRISHNAN NAIR
Chief, Cataloging Branch

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